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ABSTRACT

This paper describes a series of summer workshops for inservice teacher training (kindergarten, grades 1, 2, and 3) in the application of techniques and procedures based on pupil mastery of individualized modules of instruction. Contingency reinforcement management methods were demonstrated and practiced in the attempt to change pupil behavioral responses. It is noted that a change to individualized instruction must begin with changes in teacher classroom management skills rather than changes in students, architecture, or materials. (Author)

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The Process of Individualizing Instruction

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Based on presentations to
River Rouge, Michigan, School District Board of Education, January 1971
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16. Abstracts

This paper describes a series of summer workshops for in-service teacher training (Kindergarten, Grades 1, 2, and 3) in the application of techniques and procedures based on pupil mastery of individualized modules of instruction. Contingency reinforcement management methods were demonstrated and practiced in the attempt to change pupil behavioral responses. It is noted that a change to individualized instruction must begin with changes in teacher classroom management skills rather than changes in students, architecture, or materials.

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Prefatory Note

This paper is based upon presentations to the city of River Rouge, Michigan, School District Board of Education, January 1971; to the Michigan Department of Education Conference on Individualized Instruction, April, 1971; and to the Texas Education Service Center Personnel Conference, May 1971.

The paper deals with workshops conducted in River Rouge, Michigan by the Human Resources Research Organization Division No. 5, Fort Bliss, Texas. Details of the project are described in *Introducing Innovation in Instruction: In-Service Teacher Workshops in Classroom Management*, by William H. Melching, Edward W. Frederickson, and Paul G. Whitmore, HumRRO Technical Report 70-104, November 1970.

Dr. Melching is a Senior Staff Scientist at Division No. 5; Dr. Whitmore and Dr. Frederickson are Senior Scientists with the Division.

THE PROCESS OF INDIVIDUALIZING INSTRUCTION

Paul G. Whitmore, William H. Melching, and Edward W. Frederickson

WHO WE ARE AND WHAT WE DO

The Human Resources Research Organization is a nonprofit research and development corporation dedicated to improving human performance through behavioral and social science research, development, and consultation. We are in our twentieth year of operation. We have developed and evaluated instructional programs, studied needs for and use of training devices, and explored factors in leadership and motivation. Our work is performed under contracts with various departments of the federal government, with state or local governments, or with organizations that are involved in education or training, including public school districts.

Until 1968, HumRRO was under exclusive contract to the Army. Since then, our activities have been diversified by performing services for other sponsors. We have been particularly interested in public school systems as potential clients because of our experience in developing instructional and motivational systems for the Army.

We are not performance contractors. Rather than to become involved in school administration directly, we seek to enhance the teachers' classroom capabilities as a quality resource available to the school's existing administration. We do not publish school books and do not manufacture teaching devices. Our emphasis is on providing the teacher with classroom management skills to use in guiding, evaluating, and sustaining student learning with the materials and devices already at her disposal. We help schools and teachers to help themselves.

River Rouge Workshops

In the summer of 1970, HumRRO developed a series of workshops and conducted them over a four-week period with teachers of the kindergarten and the first three elementary grades from the school district of River Rouge, Michigan. Interest in the workshops has been most encouraging, resulting in more than 6,000 requests for copies of our report on that project.[1] A follow-on effort to the initial workshops in River Rouge was conducted during the ensuing school year, and the workshops were subsequently repeated for a different group of teachers.

We have and are continuing to provide consultation and in-service teacher training in support of River Rouge's initial efforts to individualize instruction in its schools. This type of effort and the kind of role that we play in it is described in this paper.

[1] William H. Melching, Edward W. Frederickson, and Paul G. Whitmore. *Introducing Innovation in Instruction: In-Service Teacher Workshops in Classroom Management*, HumRRO Technical Report 70-104, November 1970.

Individualized Instruction

The primary goal in the classroom is to maximize the achievement of each student, both now and in the future. To meet this goal, we must first ensure that each student is engaged in some activity that he is capable of performing at virtually all times during the school day, and whose performance contributes to the attainment of a significant learning objective. We must ensure that each student has a sufficiently high frequency of successful learning experiences to sustain his motivation to learn. And, we must protect each student from an overwhelming series of failures. To provide worthwhile activities at all times for each student and to provide a high frequency of success in such activities, it is clear that we must ultimately move to some form of individualized instruction.

Group methods of instruction often lead teachers to present instruction faster or in greater chunks than some students can effectively assimilate it. While a student is still struggling to attain previous objectives, instruction on new objectives is begun. He may never have the opportunity to go back and learn what he missed. The result is that the student gets farther and farther behind and more and more frustrated with "the system."

This problem has been handled in several projects in recent years by dividing the material to be learned into small segments or modules. Each module has a set of objectives that the student must master before he can go on to the next module. Each student must attain each objective. Attainment of 70% of an objective, or attainment of 70% of the total number of objectives, or attainment of an objective by 70% of the class, is not acceptable. All objectives must be fully attained by all students. Individual student progression is based upon individual attainment of objectives.

From a motivational point of view, the student must not be overwhelmed by a series of failures; from a learning point of view, previously learned habits should be brought to maximum strength before the learning of new habits is begun, so as to minimize interference of one with the other.

Requiring mastery of each student as he progresses is a decided departure from traditional educational practices. Teachers must change many of their previous habits and procedures. Most particularly, they will have to devise interesting and useful activities for the very fast learner, and they will have to learn to interact effectively with the very slow learner. Neither can be ignored.

The Basic Ingredients of Individualized Instruction

It may be possible to individualize instruction without having behavioral objectives, but there is no assurance that the learning activities will necessarily lead to worthwhile goals. What kinds of products do we need in order to individualize instruction?

First, we need behaviorally stated objectives.

Second, we need criterion-referenced tests for evaluating the attainment of specific objectives by individual students.

Third, we need learning activities and materials for facilitating the attainment of objectives, each requiring a minimum amount of teacher intervention.

Fourth, we need a record-keeping system for managing the progression of individual students through the various learning activities.

Individualization need not—in fact, should not—occur all at once. It can proceed progressively through several different levels. On the initial and simplest level, students progress at individual rates through a fixed set of objectives and learning materials. At higher levels, they may be offered options in sequence, in media, in content vehicle, or in various combinations of these features. Or, at some ultimate level, different students may be allowed some options in the objectives that they seek to attain. It is not necessary to introduce all these levels of individualization at once. In fact, some subject areas may not lend themselves to all of these various kinds of options.

As individualization progresses, teachers may well find that their roles are changing. Instead of explaining a procedure for 30 minutes to an entire class—20% of whom understand within the first five minutes, and 20% of whom are so far behind that they have no idea of what is being discussed—the teacher will come to function as a classroom manager, evaluating individuals on specific objectives, assigning subsequent learning activities, or working with particular students on particular learning problems. The teacher may never again work with a group of more than four or five students at one time. Most of the teacher's classroom interactions may well be with individual students.

Instructional Objectives

The cornerstone of effective management—whether it be in business, industry, government, or education—is the specification of clear, unambiguous objectives. A statement of objectives indicates what activities need to be performed, the general order in which to perform them, and how to tell when they have been performed properly. Broad or general objectives, by themselves, are quite useless. We have all had experience with "high-flown" statements of idealistic goals. Nobody can really disagree with them, but neither do they do any good. To be effective, such broad statements must be reduced to many specific, detailed items. Such objectives make it possible to run a business more efficiently, to establish a quality control system for an assembly line, or to coordinate the many separate divisions of a large corporation.

The same kinds of benefits are obtained when objectives are used in managing the classroom. Teaching can be made more efficient—the teacher can direct instructional activities toward the attainment of specific objectives on a day-to-day basis. Evaluation or quality control is much more precise—the teacher who uses objectives properly has exact information on the progress of each student on an almost day-to-day basis. And if the school has prepared integrated objectives for each grade-level and a record-keeping system based upon these objectives, then a teacher can know exactly what each student already knows and what he needs to learn next from the first day he enters the classroom.

A full set of detailed behavioral objectives provides the basis for such flexible, precise, and individualized classroom management. These advantages are bought at a relatively high cost. Deriving an effective set of behavioral objectives for the first time requires a lot of work. First, teachers must learn to think in terms of student behavior, rather than in terms of their own teaching activities as the initial basis for planning. They must first ask "What do I want my students to do?" rather than "What am *I* going to do?" Second, they must learn to specify these behaviors in unambiguous terms so that they can all agree as to exactly what behaviors are intended by a given statement. And third, they must come to some agreement as to what objectives are appropriate for each grade level. The sum effect is that the teacher, whether at kindergarten or graduate school level, must acquire and exercise the skills needed to prepare statements of behavioral objectives.

The River Rouge teachers produced a preliminary set of objectives for kindergarten through the third grade in the areas of reading and mathematics during the first workshops, but having the objectives is not enough. These teachers are now trying to learn to live by their own requirements. There are innumerable, seemingly trivial habits and procedures to be changed. Some new procedures, particularly those concerned with testing and record-keeping, are literally being invented, and this is being done by the participating teachers themselves. Some teachers are making these many adjustments more rapidly than others, simply because their situations are different and they have different habits to change.

This is an effort worth encouraging to whatever extent is necessary. Most of the major successful educational innovations of recent years have begun with the

development of a set of behaviorally stated, student performance objectives. These preliminary objectives need to be further developed and refined. Having such objectives makes it possible to explore other important educational innovations.

Changing to Individualized Instruction

How do we go about changing from group instruction to individualized instruction? The U.S. Office of Education's PREP 16 on Individualized Instruction offers 10 recommendations on how to go about individualizing. Recommendation number seven reads: "You can't change your program, your teachers, your people, your curriculum, and just say it's going to be different tomorrow. First, you change what you can; then you gradually change the people, and finally you change the curriculum."

Let us consider how the development of individualized instruction might best proceed in a school or in a school system. Suppose that there is a group of teachers volunteering to participate in such a program—probably not all the teachers at any one school, but at least one teacher from each grade or each course at each school.

The first job is to collect various sources of both terminal and enabling objectives. The initial set of objectives does not have to be complete or final, but it should span all grades concerned in a single, straightforward sequence. Next, the participating teachers need to pool the learning materials and test items that they already have for each objective. At this point, they can take stock to see what else needs to be done, decide who will do what, and lay out a tentative schedule. A preliminary set of objectives provides a basis for identifying, managing, and sharing the work.

Additional materials may be developed by the teachers or, if money is available, bought from a commercial source. However, extensive acquisition of commercial materials should be delayed until after a firm system has been planned in detail, probably some time in the second year of the program. The group should also give some consideration to the development of a record-keeping system and to the development of a reporting system. The latter should take into account the expectations of and acceptance by parents who should be involved most particularly in this aspect of the program.

As the program progresses and other teachers volunteer to join the effort, consideration should be given to the establishment of learning material centers in the various schools. By the end of the third year, many of the initial group of teachers should be operating effective individualized classrooms. From here on, the primary effort will be concerned with "fine tuning" of the system and with inducing additional teachers to join the program.

Student Motivation and Discipline

All programs of instruction must include effective techniques for motivating students to learn and for maintaining order in the classroom. Individualized (and behavior-oriented) approaches to institute such classroom control (known as "contingency management" or "behavior modification" as well as by other designations) are highly efficient. Contingency management—the term we use—is not concerned with the motives, needs, or attitudes of students, but deals only with the behaviors that the students actually exhibit in the classroom. It strengthens the appropriate behaviors they exhibit by reinforcing or rewarding them, and it weakens the inappropriate behaviors by extinguishing them—that is, by ignoring them—or by punishing them, or by rewarding incompatible behaviors; that is, by means of counter-conditioning. For instance, a child's staying in his seat is incompatible with his getting out of his seat; he can't be both in and out of his seat at the same time. Rather than punish him for getting out of his seat, he might be rewarded for staying in his seat.

The rewards and punishments must be administered contingently, that is, they must be administered consistently and immediately after the occurrence of either an appropriate or an inappropriate behavior. Even brief delays dissipate their contingency effect.

The kinds of things that can be rewarding vary widely for different students in different situations at different times. Reinforcers may be things to eat or drink such as candy, cookies, or soda pop. They also may be objects such as books and toys, or activities such as play-time or free-time or going on a field trip. Reinforcement may also consist of teacher attention or approval or increased control by the student over his own activities—independence. Of course, success, itself, is reinforcing. The student who succeeds at learning is motivated to learn more. The object is to find the reinforcer that works "right now" and then gradually shift the child to more appropriate reinforcers.

Contingency management exposes the traditional dichotomy of permissive versus strict disciplinary practices as being false and misleading. The choice is not between strictness on the one side or permissiveness on the other, for neither is in itself wholly adequate. Permissiveness refers to noncontingent reinforcement—the child is rewarded no matter what he does. Consequently, undesirable behaviors are as likely to be strengthened as are desirable ones. Such practices are not prescribed by contingency management. Strictness refers to disciplinary practices that consist solely of punishing undesirable behaviors. It fails to reward desirable behaviors. Consequently, it fails to use the most powerful tool we have for motivating learning and maintaining discipline. In addition, punishment has some undesirable side effects. When an individual is punished, he will attempt to escape from the situation in which he was punished, and he will attempt to avoid getting into that situation in the future. If the individual is a child and the situation is a classroom or school, the child may either "tune out" or "drop out." If the punishing situations are diffused throughout the community, the result may be social alienation. Because of its potentially disastrous side effects, punishment should be used sparingly. The practice is to use punishment appropriately as only one of several tools at our disposal.

Our schools and our society in general tend to use punishment as an all-purpose disciplinary and motivational tool—in addition, we often apply punishment in ineffective ways. Punishment may either be too weak or too-long-delayed to be effective. In such instances, we not only fail to control the undesirable behavior, but also elicit avoidance and aggression. We make a bad situation worse—often much worse. It is not uncommon to apply punishment inappropriately as a means of controlling trivial undesirable behaviors that could be more effectively controlled by ignoring them or by rewarding incompatible behaviors. In so doing, we have created or contributed to problems of gargantuan proportions, such as high drop-out rates and rebellious aggression from our students.

In line with research in the area, the *basic* classroom environment should reward desirable behaviors and ignore undesirable ones. The strengthening of desirable behaviors in an environment is frequently accompanied by a decrease in the occurrence of undesirable behaviors. Additional controls should be considered only after this basic environment has been established and behavior in the classroom has stabilized.

Who Needs to Change?

The primary goal of individualized instruction is to increase the achievement of students, both now and in the future. Obtaining such improvement requires that teachers define the objectives for their instruction in detailed behavioral terms, that teachers use effective techniques for modifying students' behavior toward those objectives, and that teachers require each and every student to exhibit the specified behaviors before progressing from one point of instruction to another. Thus, although the ultimate changes

are to be in the behavior of students, obtaining such changes requires that changes first be made in the classroom management behavior of teachers.

Obtaining Permanent Changes

A well-designed and well-executed instructional workshop is an effective technique by which to bring about such changes in the behavior of teachers. Through extended work-training sessions, workshop participants are able to acquire both the necessary skills and the confidence needed to initiate and pursue such changes. It is important that the initial effort establish the desired behaviors in the teachers' classroom practices and that a long-term effort be undertaken to sustain such teacher behaviors once established.

Our workshops on behavioral objectives, mastery modules, and contingency management are designed to change teachers by means of first-hand practice and experience. Insofar as possible, instruction in each workshop follows a general sequence of steps:

(1) Rationales for the given educational practice are presented as a basis for convincing the participants of the merit of the practice.

(2) The principles governing the application of a technique to a specific situation are introduced as a basis for decision and action by the participants.

(3) Descriptions of applications of techniques to specific situations are presented for analysis and discussion by the participants.

(4) Techniques are applied by the teachers in real situations under the observation and guidance of the change agents.

The first and second steps are designed to be accomplished quickly so that most of the workshop time is devoted to the steps involving applications of techniques. During the applications in real situations, the participating teachers are asked to use instructional materials, course content, and specific behavior problems from their own work environment and experiences. The objectives and mastery modules prepared by the teachers during workshops provide a direct carry-over from the workshop activities to their subsequent classroom practices. The contingency management workshop requires that the participating teachers actually teach students for an hour or two a day for the duration of the workshop. This requirement is necessary to provide the teachers with an opportunity to practice the techniques as they learn about them and to allow observation of each teacher's performance for appropriate feedback and guidance. Some of our results in River Rouge may be briefly described as follows.

The primary purpose of this series of workshops was to provide members of the school staff with sufficient practice and experience to implement the procedures in their classrooms in the ensuing school year. In the objectives and modules workshops, the teachers formed into grade-level groups to produce a draft of sets of modules, with accompanying terminal and/or enabling objectives, for reading and for mathematics for grades one, two, and three. In addition, statements of desired entry-level performances for grade two were also drafted. A total of 210 terminal objectives were prepared by the teachers during the summer workshops. Each teacher received a copy of all materials for use during the coming school year, providing a tie between the activities in the workshops and the teachers' subsequent classroom practices. It also provided a basis for establishing a common curriculum for each of these grades across all schools.

During the two-hour instructional periods when children were present in the classroom, the workshop staff visited the classrooms and observed teacher behavior in order to make a diagnosis and prescription for each teacher concerning the use of contingency management procedures and techniques. It became evident that the majority of the teachers needed to provide more response opportunities to the children, and to provide more approving behaviors. In order to accomplish this, teachers were asked to use candies as reinforcers and to dispense a minimum of 50 candies per hour. The level of 50

represented a middle figure for approving behaviors as determined from the early observation record sheets. The teachers were further instructed to reinforce only academic behaviors at this time. They were not to use candy to control disciplinary problems.

In going from room to room, the workshop staff observed that a variety of technical errors were being made by the teachers in dispensing the candy. For instance, some teachers were having teacher aides hand out the rewards. This tended to delay the reinforcement, and the teacher was not acquiring the proper secondary reinforcement properties desired of her. Also, some teachers were not providing social or verbal reinforcement in conjunction with the candy; this tended to be a problem for some teachers for a considerable period of time. Some teachers dispensed several candies at one time, thereby reducing the reinforcing value of a single piece. At least one teacher had added an element of punishment in that she took candies away from the child if he misbehaved. These technical errors were pointed out to the teachers and explanations were provided.

It was also pointed out to the teachers that some of them would have to change their teaching style slightly to dispense 50 pieces of candy per hour. Many would have to create more academic response opportunities, while others would have to gage their questions to the level of the individual child, since they could not reinforce the child unless he answered correctly. It was also suggested that teachers might try drawing the children in close around them during the period of time in which they were providing response opportunities. In this way, they could dispense the candies immediately and unobtrusively. It was decided that the teachers should continue the candy program for the rest of the workshop.

During the third week, it was also evident that some of the teachers still were not providing enough social reinforcement or verbal praise when they dispensed the candy. Other teachers still did not provide enough response opportunities for all the students in the classroom. Some teachers tended to call upon only those children who volunteered to answer questions, whereas other teachers seemed to respond only to those children who were most insistent.

Almost all teachers and teacher aides had some difficulty ignoring inappropriate behaviors. In many cases, basic concepts involved in the procedure had been misunderstood. During one discussion, it was pointed out that ignoring inappropriate behaviors could be effective only if the appropriate behaviors were reinforced. Some teachers and aides had been ignoring, or at least trying to ignore, inappropriate or disruptive behavior without reinforcing appropriate behavior, and as a result, they were not having much success eliminating the disruptive behavior.

By the end of the third week, the teachers began to ask more questions and to raise specific problems that they noted in the classroom. These questions and problems were discussed with the entire group. In many cases, teachers suggested solutions to problems brought up by other teachers.

During the two-week period when teacher observations were recorded, data were obtained for three teacher behaviors—response opportunities (RO), approving behaviors (AB), and disapproving behaviors (DB). Thirteen of the teachers increased their rate of providing response opportunities by at least 50%. The remaining nine teachers initially used a high rate of teacher-student interaction, which they maintained during the observation period. Thirteen teachers had an *increasing* rate of approving behaviors, accompanied by a marked decrease in disapproving behaviors. The remaining teachers maintained a relatively high level of approving behaviors. The changes in disapproving behaviors were quite noticeable in many teachers who had routinely used punishment. A total of 15 teachers showed a decrease in their rates of disapproving behaviors.

It can be concluded from the observation of the teachers that the behavior of the teachers as a group changed significantly. They learned to present more response opportunities to the students. They learned to use more positive reinforcing statements and gestures, along with the use of fewer aversive or punishing behaviors.

As part of the follow-on program during the school year, the School District's director of federal projects visited each participating teacher's classroom once each week for the first six weeks and then once every two weeks. During these visits he recorded the occurrence of the teacher's response opportunities, approving behaviors, and disapproving behaviors. In general, the rate of response opportunities and approving behaviors has tended to hold at the level established during the latter part of the summer workshop. The rate of disapproving behaviors initially rose above the final workshop level, but has declined steadily since then.

In December, the director reported that

> "... the application of contingency reinforcement techniques has been quite widespread and generally extremely successful.... Sixteeen teachers have prepared a total of 20 formal CM [contingency management] programs. Currently 13 teachers are implementing their first CM program. Six teachers are either planning another program or have a second program operational.... seven teachers have completed their programs. The decision to cease the formal program in all cases is based on marked improvement in pupil performance."

In the latter part of the school year even greater change has been evidenced as a result of some of the teachers' experiencing their first successes in solving difficult motivational and disciplinary problems in their classrooms.

In order to help sustain the changes in the teachers' classroom practices, the director of federal projects has published several newsletters featuring activities of participating teachers. This provides social reinforcement for those teachers whose activities are featured and designates them as models for others to emulate. In addition, the workshop staff provided the teachers with consultation according to a prearranged schedule. This has also helped to direct and sustain changes in the teachers' classroom practices.

A change to individualized instruction must begin with changes in teacher behavior rather than changes in students, architecture, or materials. Individualization of instruction cannot occur effectively for all students until teachers first acquire the necessary classroom management skills.